Solarize 101 Workshop

Lisa Orr
Frederick County Office of Sustainability
and Environmental Resources

Workshop Agenda

- Meeting Goals
- What is the Green Homes Challenge?
- Why Solar? Why Here? Why Now?
- What is Solarize Frederick County?
- Solar Financials and Incentives
- Next Steps & Evaluation

Workshop Goals

- **Educate and Motivate**
  - Efficiency First
  - Learn about solar options and technologies
  - Benefits, Economics, Available Incentives
- **Learn about Solarize Volume Purchasing and Incentives**
- **Answer your solar questions**
- **Make everyone here advocates for Solarize Frederick County!**

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The Green Homes Challenge

Challenge 1: Be a Power Saver
Helps residents reduce energy consumption and utility bills

Challenge 2: Be a Green Leader
Helps residents adopt environmentally-friendly practices

Special Pilot Project
Solarize!

Challenge 3: Be a Renewable Star
Helps residents use renewable energy

Launching May 15! FrederickGreenChallenge.org

SUSTAINABLE FREDERICK COUNTY

GREEN HOMES CHALLENGE
FREDERICK COUNTY, MD

SOLARIZE
Frederick County

FrederickGreenChallenge.org

GREEN HOMES CHALLENGE
FREDERICK COUNTY, MD

Why Certify?

- Public Recognition
- Yard signage
- Annual Prize Drawings
- $$$ Higher Solarize Incentive Grants!
- Demonstrate to others that you are making a positive difference

Efficiency First!

Be a Power Saver!

Energy Efficiency Rebates

No Better Time!

Potomac Edison Energy Efficiency Program:

- 50% Rebates (up to $2,000)
- Electric Heating and Cooling Systems

MD Dept. of Housing and Community Development, Be SMART:

- Loans
- Rebates up to $2,000 for Households not eligible through Potomac Edison

Additional rebates for lighting, appliances, HVAC systems.

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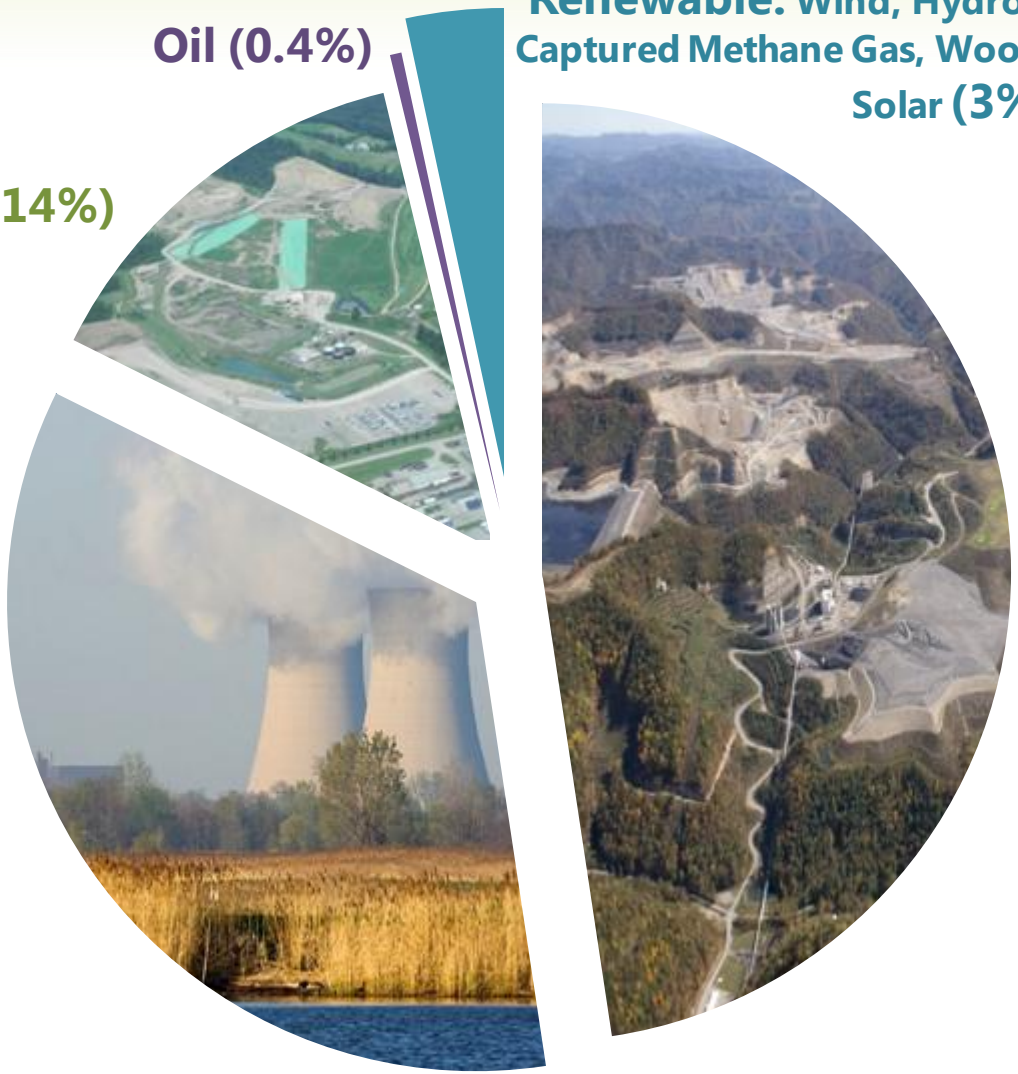
Where does our energy come from?



2011 data from Potomac Edison

Maryland's Goals & Progress

"We motivate people by helping them to see they are a critical part of a much larger mission."

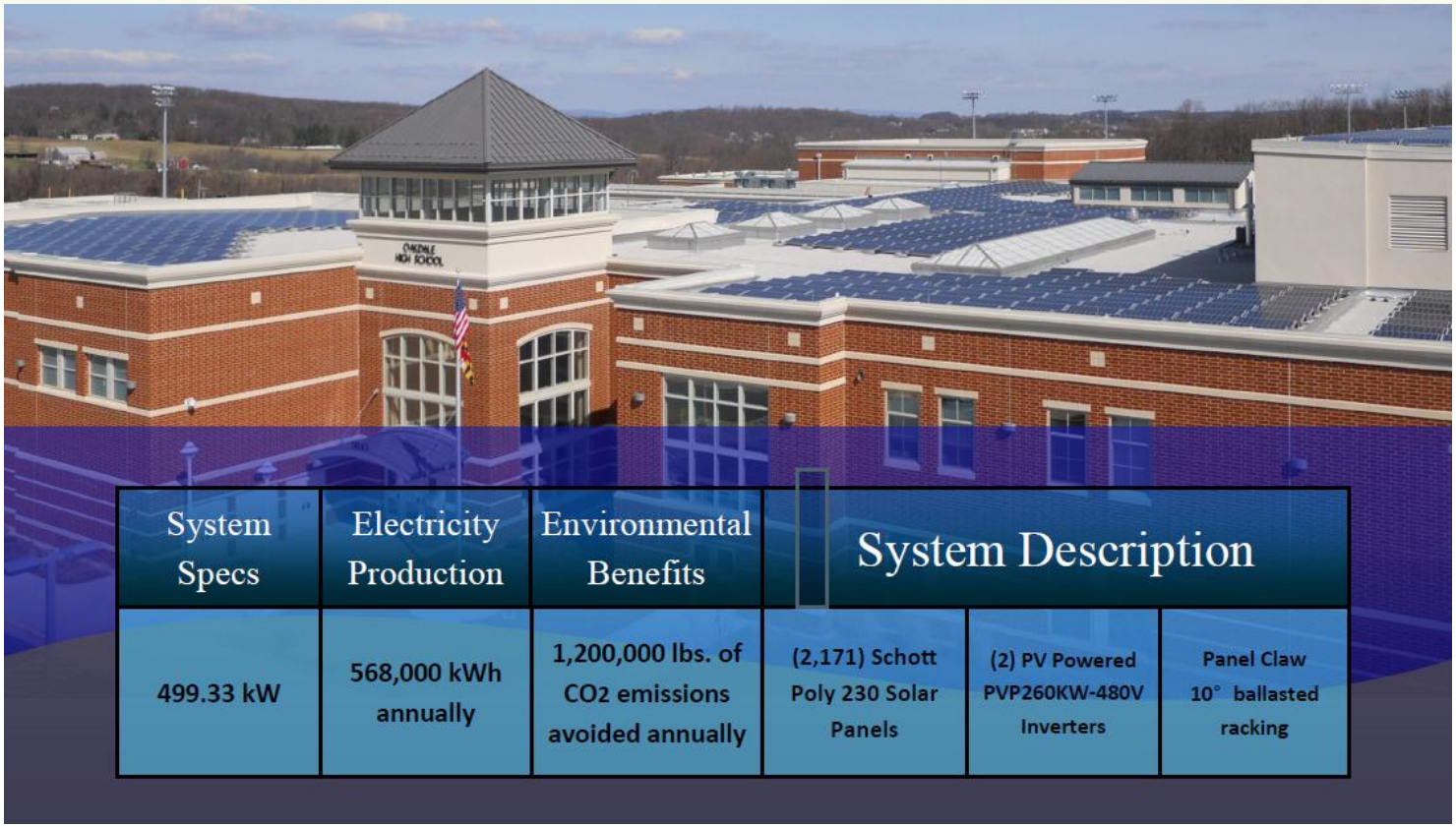
- **GOAL: Increase Maryland's In-State Renewable Energy Generation to 20% by 2022.**
- **GOAL: Reduce Maryland's greenhouse gas emissions by 25% by 2020 (from 2006 baseline).**
- **GOAL: Reduce per capita electricity consumption by 15% by 2015 (from 2007 baseline).**

Maryland's Progress

- Increased State's solar energy generation capacity by 750% from .1 MW in 2006 to 77 MW in 2012.

- Supported over 3,200 residential-scale solar and wind installations through incentives, adding an additional 17.9 MW of electricity to the grid.
- Supported 17 installations with 8.8 MW of renewable generation capacity on public buildings across the State through Project Sunburst.

Project Sunburst in Frederick County



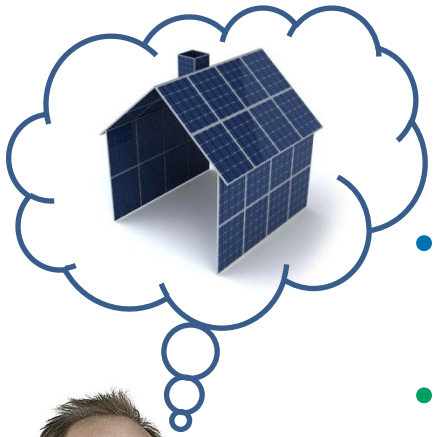
System Specs	Electricity Production	Environmental Benefits	System Description		
499.33 kW	568,000 kWh annually	1,200,000 lbs. of CO_2 emissions avoided annually	(2,171) Schott Poly 230 Solar Panels	(2) PV Powered PVP260KW-480V Inverters	Panel Claw 10° ballasted racking

Oakdale High School; Mercury Solar PV System

SOLARIZE
Frederick County

Why Solarize?

Households, Businesses, Governments



- **Environmental Reasons?**
  - Reduce greenhouse gas emissions
  - Reduce air pollution and urban smog
  - Reduce environmental problems stemming from mountain top removal or nuclear waste isolation
- **Health Reasons?**
  - Cleaner air for asthma suffers and children
- **Energy Security and Resilience?**
  - Homeowners…. Not so much
  - Less reliance on traditional energy sources during disasters
  - Quicker recovery after storms; less demand on traditional energy
- **Economic Reasons?**
  - Avoid price increases in electricity and/or fuels
  - Take advantage of current financial incentives and tax credits

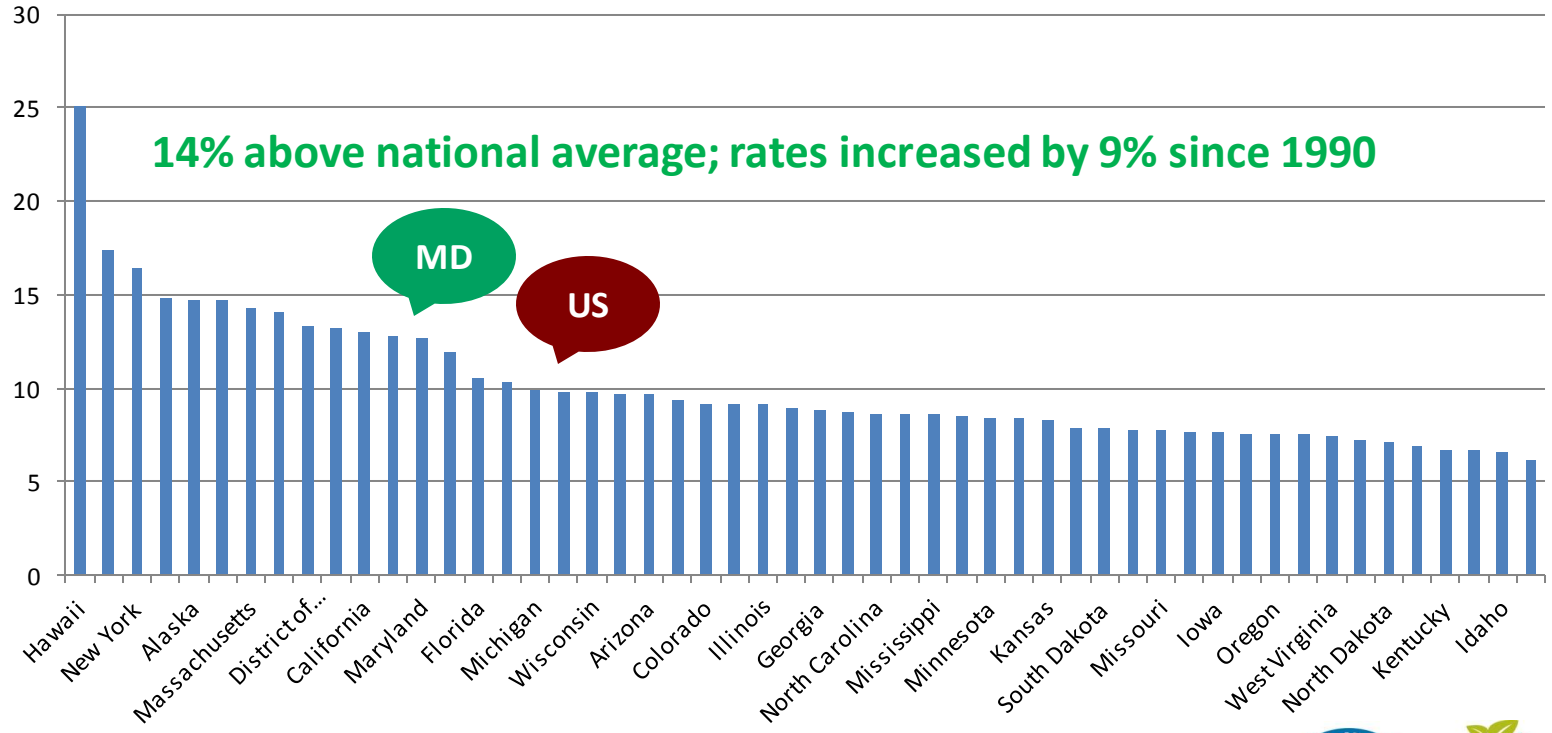
SUSTAINABLE FREDERICK COUNTY

GREEN HOMES CHALLENGE
FREDERICK COUNTY, MD

Why Solarize

Avoid price increases in electricity

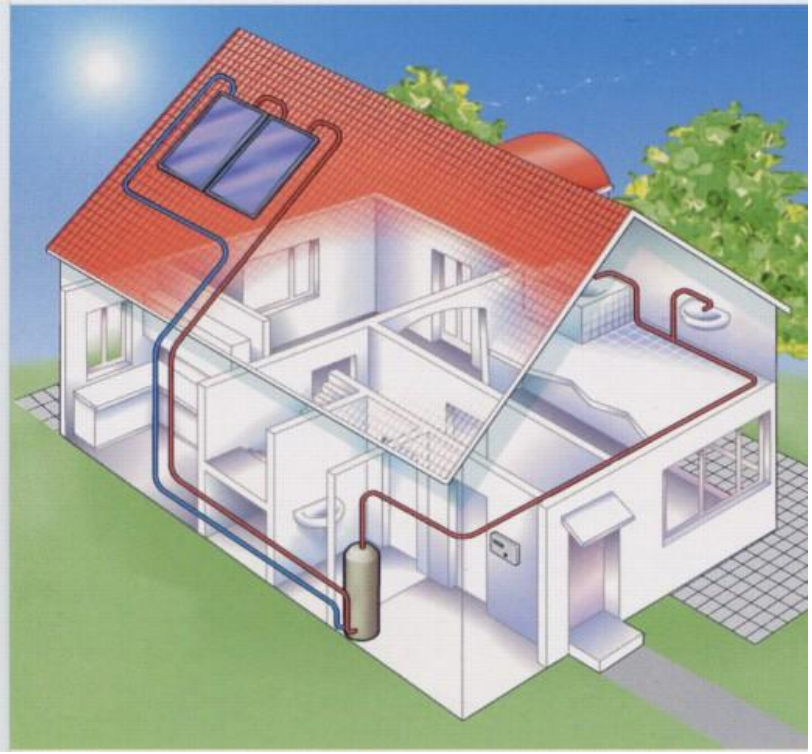
Average Retail Price of Electricity (cents/kWh)



eia Independent Statistics & Analysis U.S. Energy Information Administration

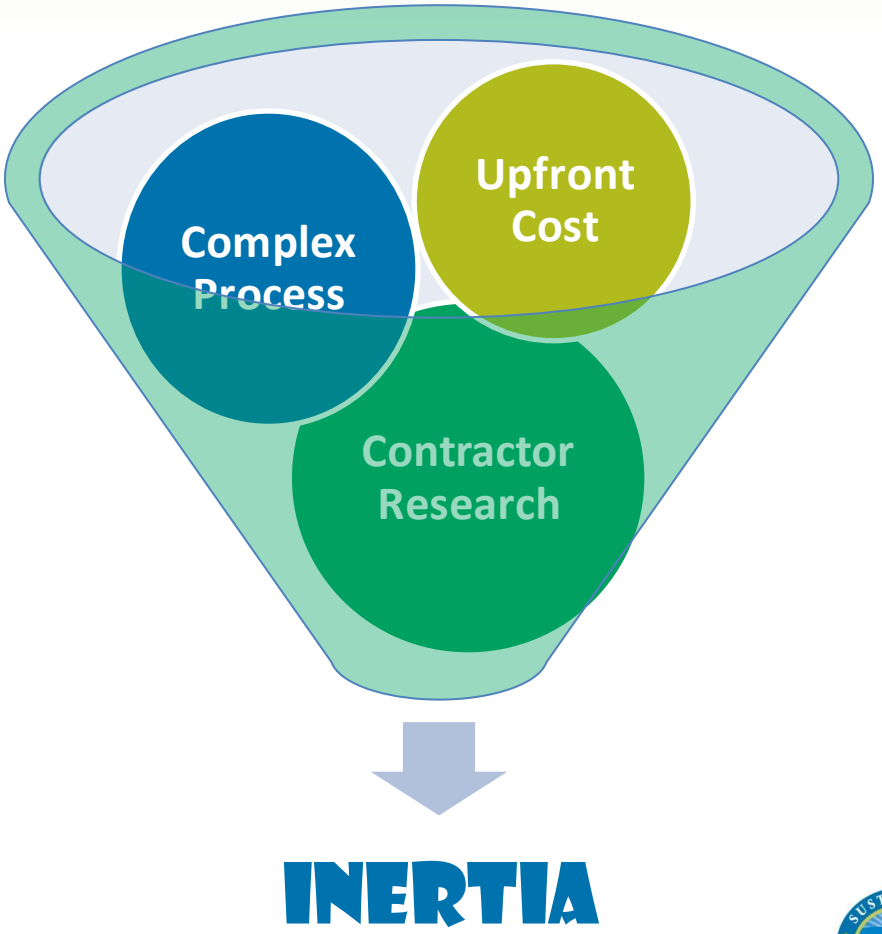
Why Solarize?

Reduce cost of generating hot water



- Hot-water heating is the 2nd biggest energy user in the home after heating and cooling
- Water heaters consume about 21% of an average home's total energy use
- A solar hot water system can
  - Provide 50 – 80% of a household's hot water needs
  - Supplement your home heating system

Why Not Solarize? - Barriers



Why Now?

- **While they last! Take advantage of…**
  - **Maryland solar grants ($1,000) and Solarize grants**
  - **30% federal tax credit** (after incentive grants)
  - **Sale of Solar Renewable Energy Certificates/Credits**
- **Be part of the solution!**
  - **Help address state/national/global energy and environmental issues.**

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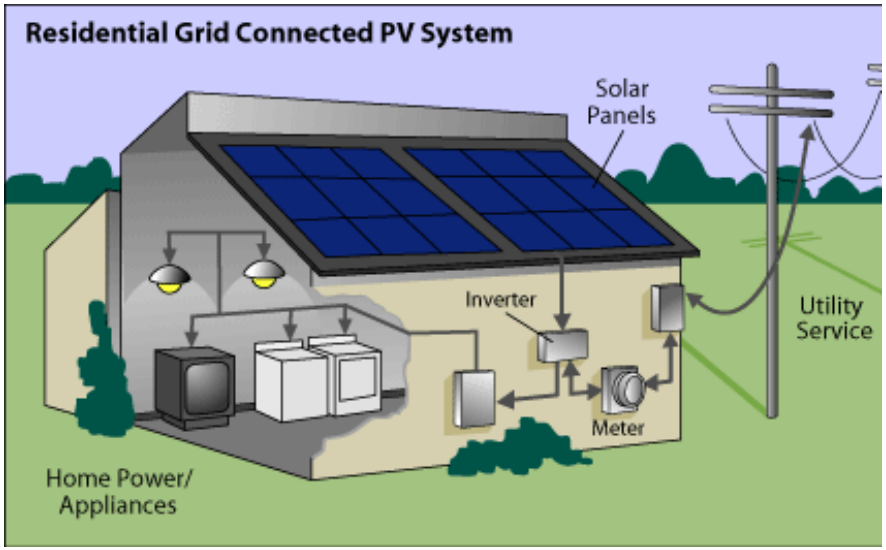
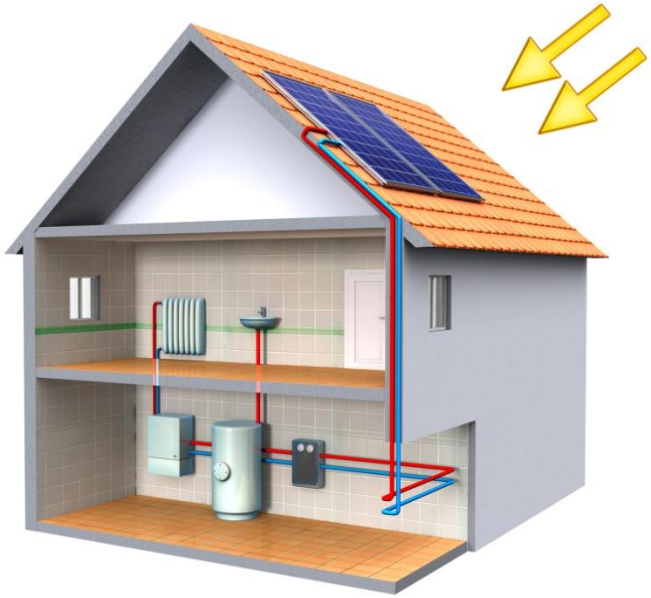
Volume Purchasing Program with Incentives

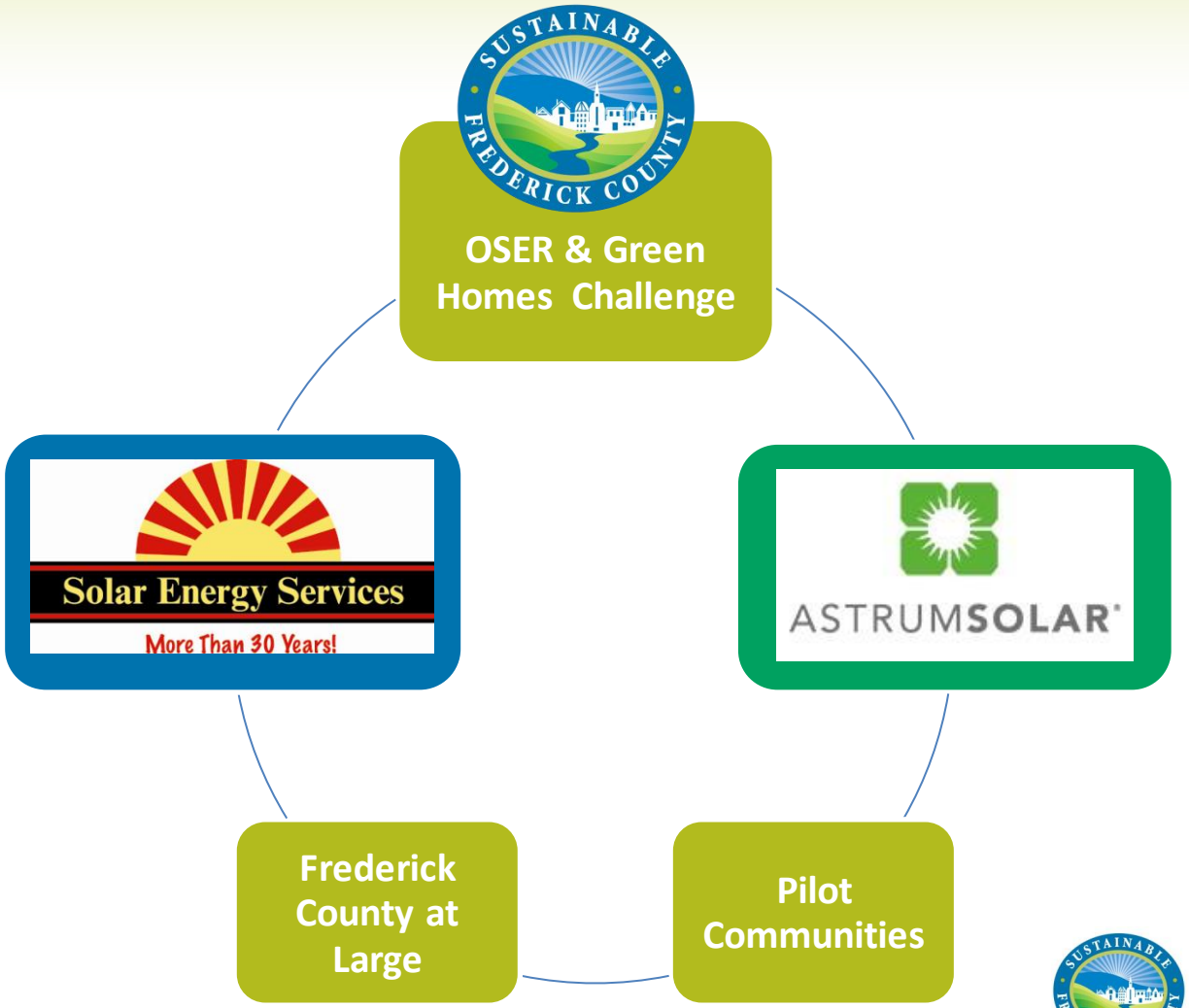
- Purchased or Leased Solar Electric (PV) Systems
- Purchased Solar Hot Water (Thermal) Systems



From Nasa Science-ScienceNews

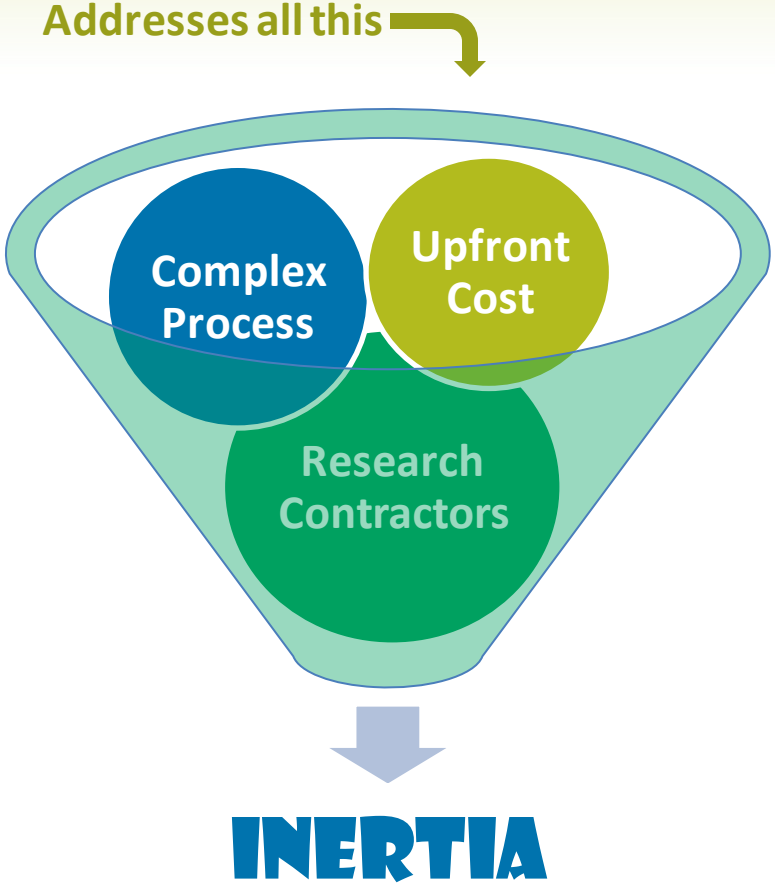


Solarize Partners



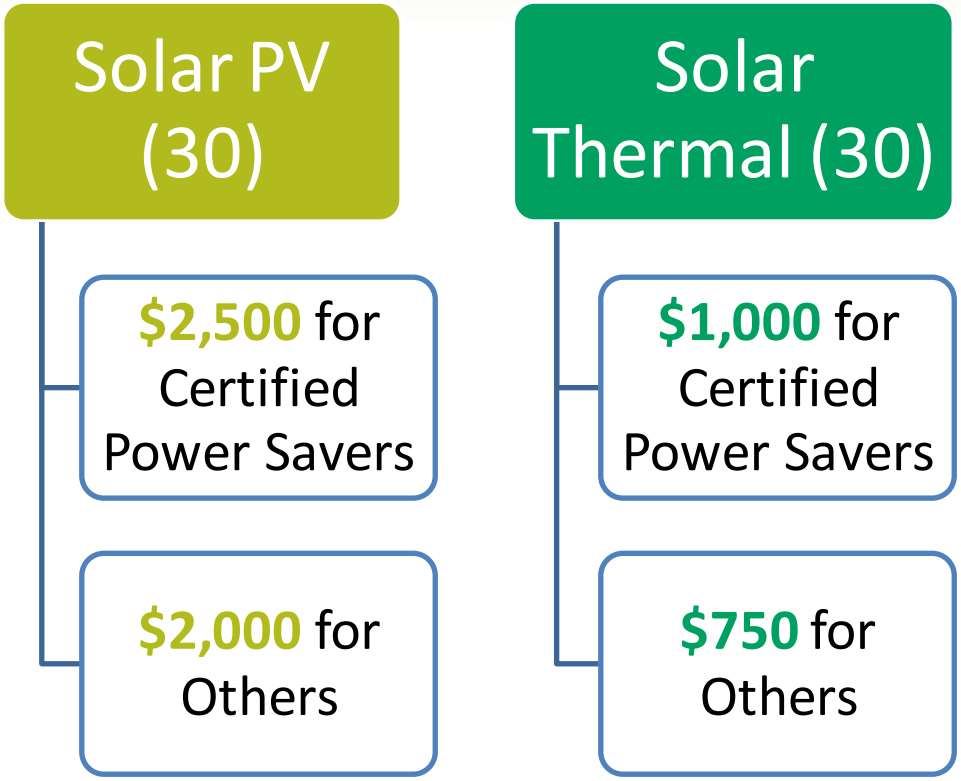
Solarize Frederick County

- **Goal: Increase Installations**
  - Educate Homeowners
  - Simplify Process by Vetting and Selecting Installers
  - Reduce Costs: 2 Ways to Save
    - Volume Discounts for All
    - Grants for Solar PV & Thermal Systems
  - Motivate
    - Limited Enrollment Period
      - ~4 months: April 26 – August 30
    - Pilot Communities
  - Reduce Time to Contract and Install



Solarize Incentive Grants

- Granted upon Contract
- **First Come-First Served**
- Processed as discounts on Homeowner Contract
- **Contractor Reimbursed, not Homeowner**
- Grantees required to provide photos and testimonials, and to share Solarize information with 3 households



Solarize – Installer Role

- **Offer Volume Discounts**
- Free Site Assessments
- Contracting
- Processing Solarize Incentive Grants
- Permitting and Inspections Coordination
- Installation
- Coordination with Potomac Edison for Grid Tie-In
- Sign-up Customer with SREC Aggregator/Marketer
  (if applicable or desired)

Discounts with Greater Volumes

Solar Electric (PV) Installer

ASTRUMSOLAR

- Average Astrum retail price per watt for a 6.2 kW system in 2013 is $4.52
- Discount ranges from ~15% for Tier 1 to ~24% for Tier 5

	Tier 1 1-25 kW	Tier 2 25-50 kW	Tier 3 50-100 kW	Tier 4 150-250 kW	Tier 5 >250 kW
Purchase ($/Watt)	$3.85	$3.80	$3.65	$3.55	$3.45
Lease ($/kWh)	$0.115	$0.110	$0.105	$0.100	$0.095

Discounts with Greater Volumes

SOLARIZE Frederick County

Solar Energy Services
Celebrating over 30yrs

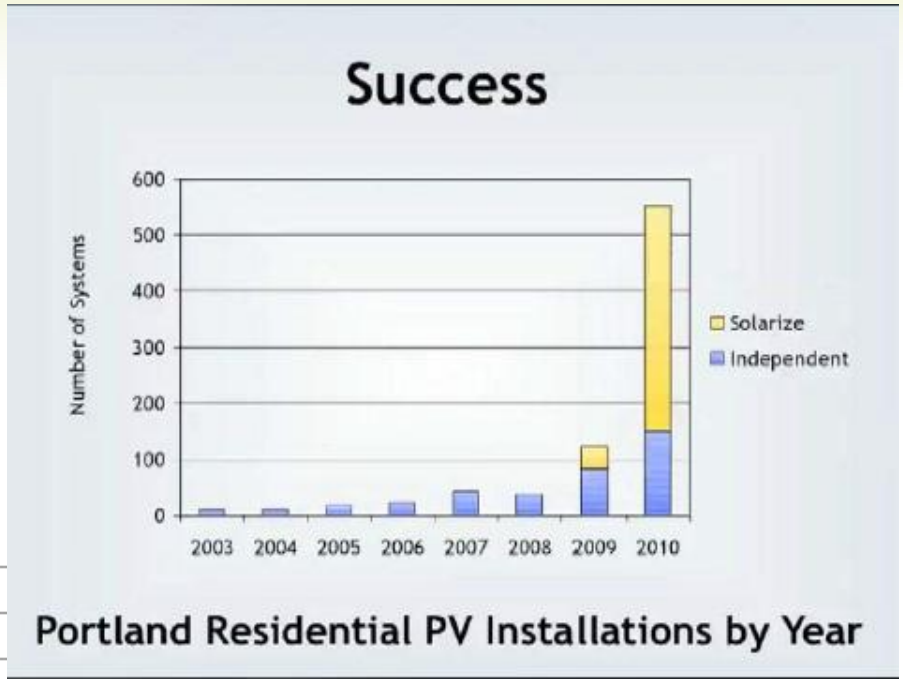
Solar Thermal Installer

Solarize Frederick County - Solar Thermal Pricing				
	System Size (people served)	**Retail Cost**	**Solarize Cost**	**% Discount from Retail**
Tier 1: Up to 10 Systems of Any Size	1-2 person	$8,725	$7,725	11.5%
	2-3 person	$9,446	$8,446	10.6%
	3-4 person	$9,625	$8,625	10.4%
	5+ person	$10,064	$9,064	9.9%
Tier 2: 11-29 Systems of Any Size	1-2 person	$8,725	$7,416	15.0%
	2-3 person	$9,446	$8,137	13.9%
	3-4 person	$9,625	$8,343	13.3%
	5+ person	$10,064	$8,755	13.0%
Tier 3: 30+ Systems of Any Size	1-2 person	$8,725	$7,004	19.7%
	2-3 person	$9,446	$7,725	18.2%
	3-4 person	$9,625	$8,034	16.5%
	5+ person	$10,064	$8,343	17.1%

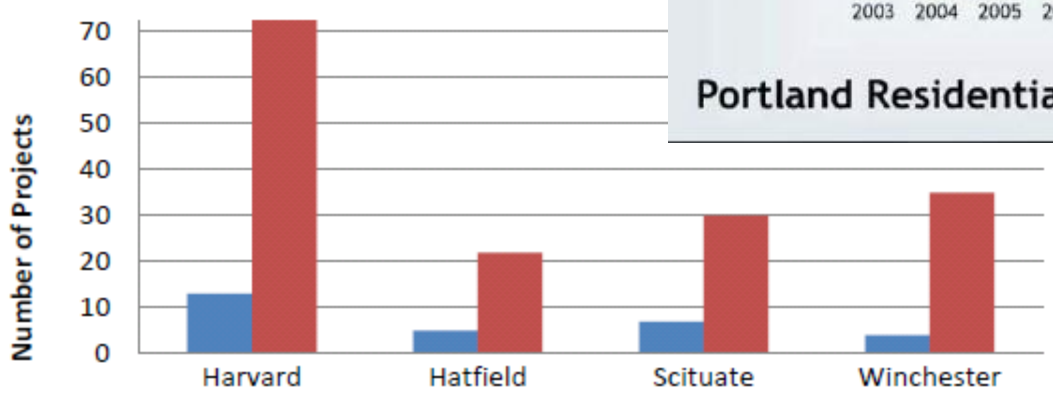
Sustainable Frederick County

Green Homes Challenge
Frederick County, MD

Other Solarize Community Successes



Solarize Mass Pilot Communities



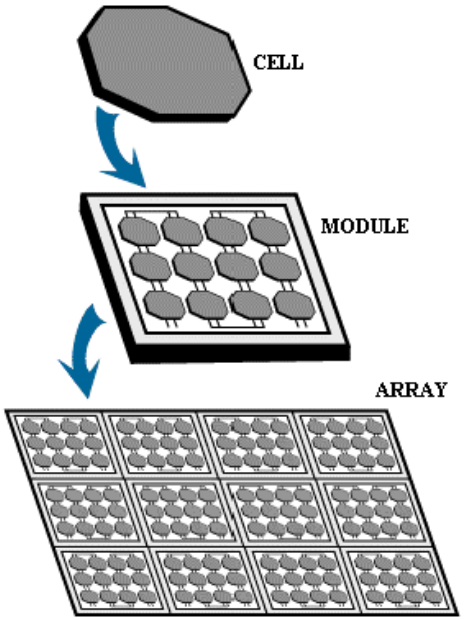
	Harvard	Hatfield	Scituate	Winchester
Systems Pre-Solarize	13	5	7	4
Solarize Contracts	75	22	30	35

Solarize Timeline

Solarize Frederick County Timeline	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Installer Solicitation & Selection													
Outreach and Education													
Household Enrollment													
Site Assessments by Contractors													
Installations													
Evaluate and Celebrate													

Photovoltaic (PV): "photo" (sunlight) + "voltaic" (electricity)

Solar Photovoltaic (PV) Systems



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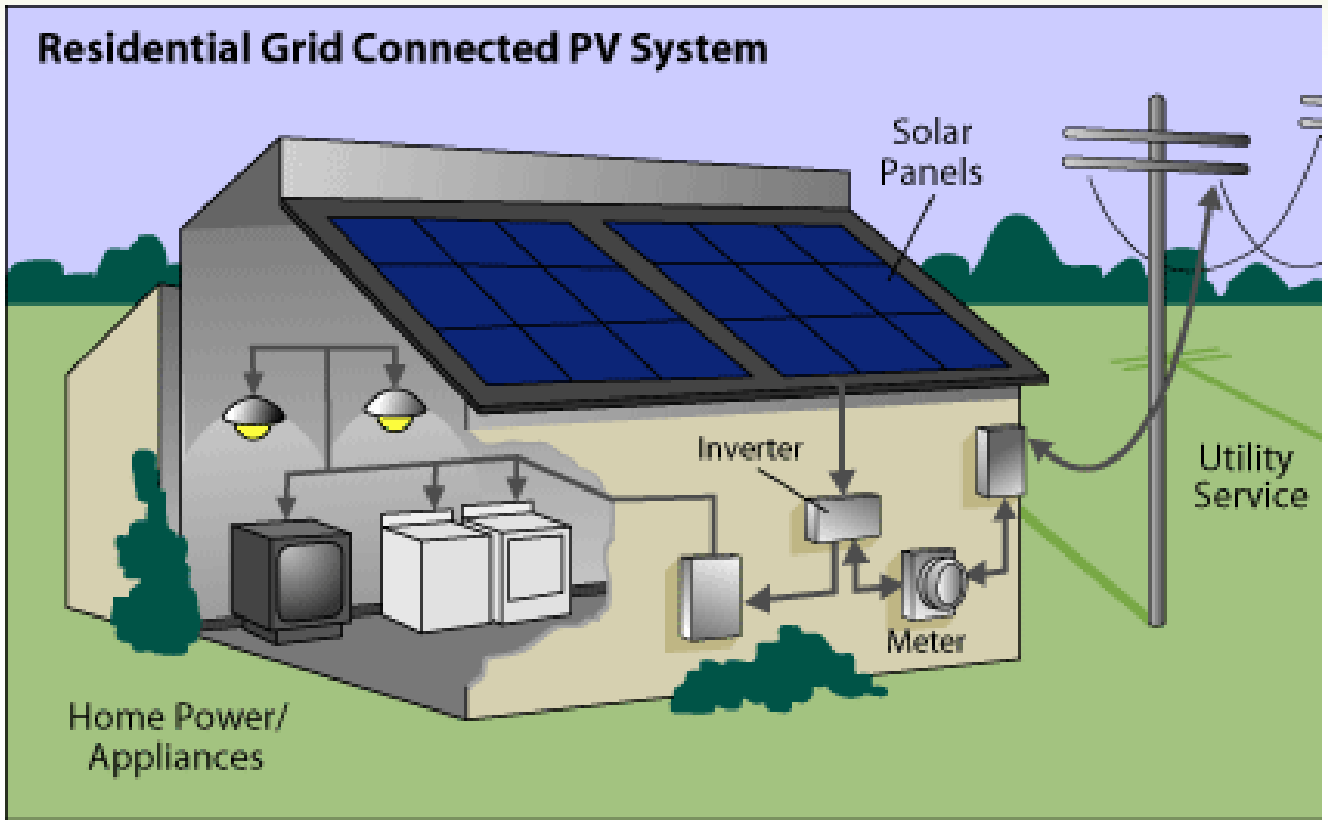
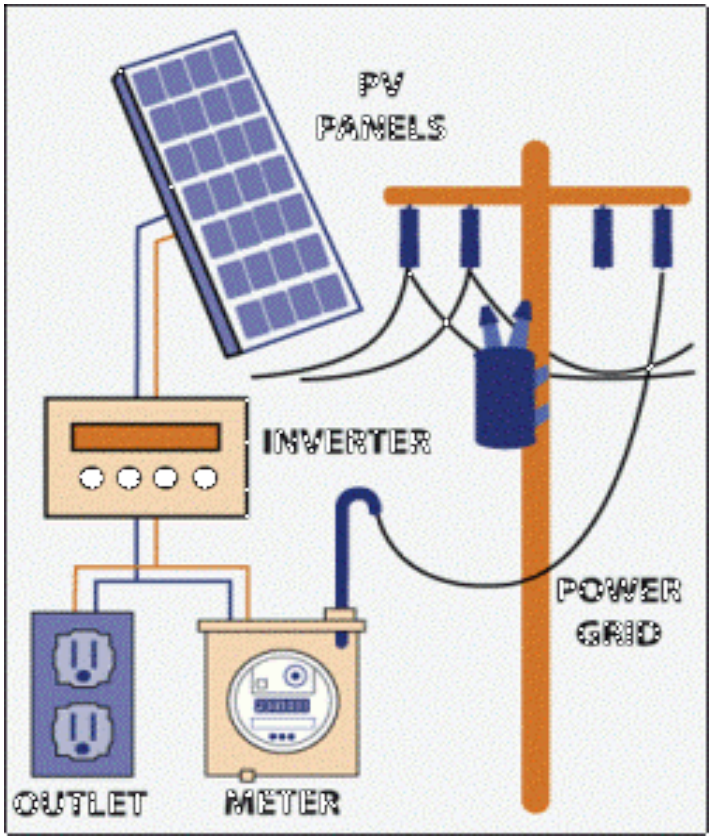


What do "Grid-Tied" and "Net Metering" mean?

Video

http://www.youtube.com/watch?v=dngqYjHfr98

"Grid-Tied" &"Net Metering"

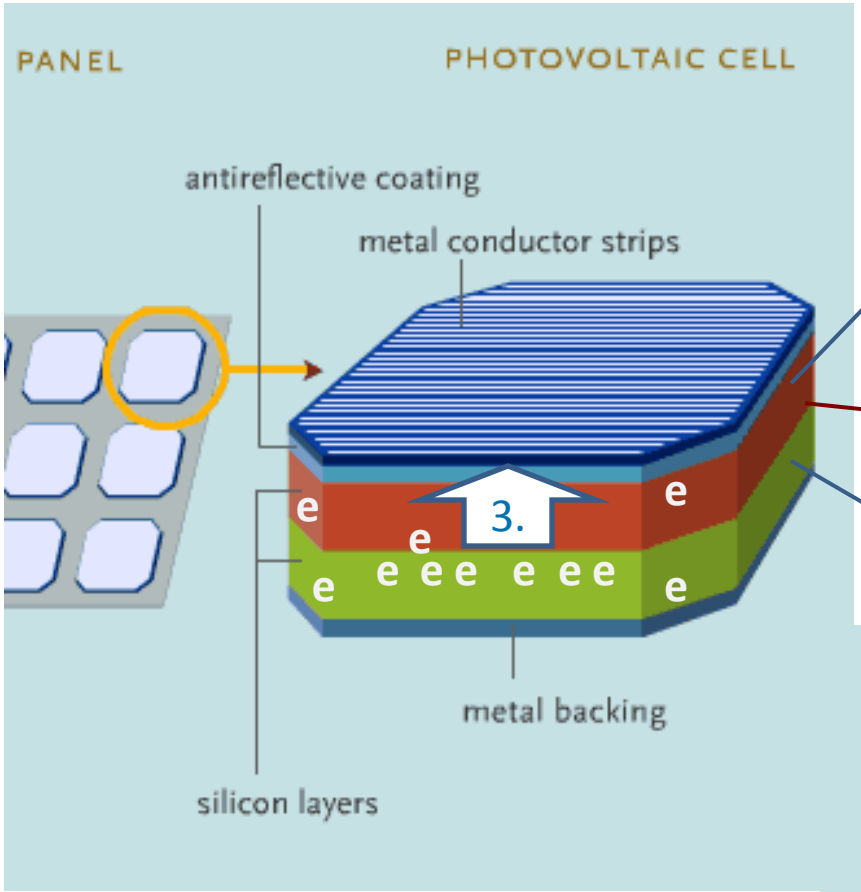


From GreenCollarEconomy.com

- **Grid-Tied:** Excess electricity generated stored on grid instead of battery back-up system.
- When system produces more electricity than you are using, your meter runs backward.
- When you are using more electricity than system is producing, you use electricity off the grid.
- **Net Metering:** You are only billed for the difference between the amount of electricity you put onto the grid, and the amount you use from the grid.
- If, over the course of a year, you put more onto the grid than you take, your account is credited for the value of that electricity.

How does Solar PV Work?

http://www.youtube.com/watch?v=DQuFMDkKTCA



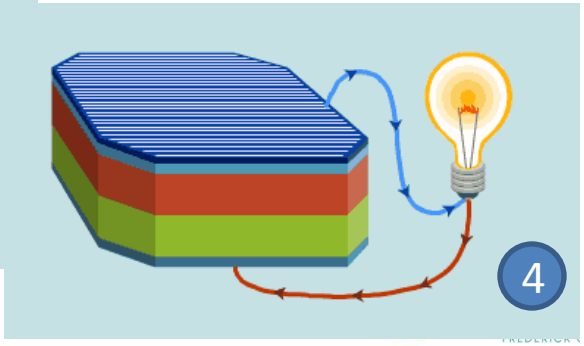
Photons

2

Phosphorus Doped (more electrons) -> positive charge at junction

Electrical Field created at juncture 1

Boron Doped (less electrons) -> Negative charge at junction



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Information from PBS-NOVA
http://www.pbs.org/wgbh/nova/tech/how-solar-cell-works.html

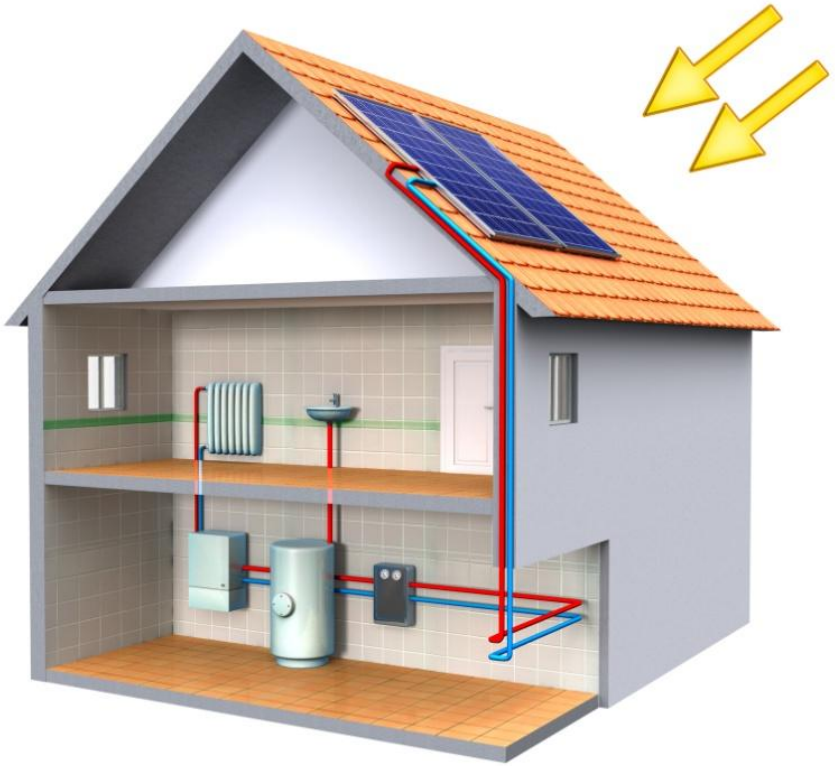
Solar PV – Installation Options

Courtesy of
PotomacWindEnergy.com

Solar Thermal/Hot Water Systems

"Solar Thermal" means solar heating. Often refers to hot water; can include space heating

A solar hot water system does not replace your hot water heater; it pre-heats its water, reducing the time and fuel needed to raise water temperature to 120°

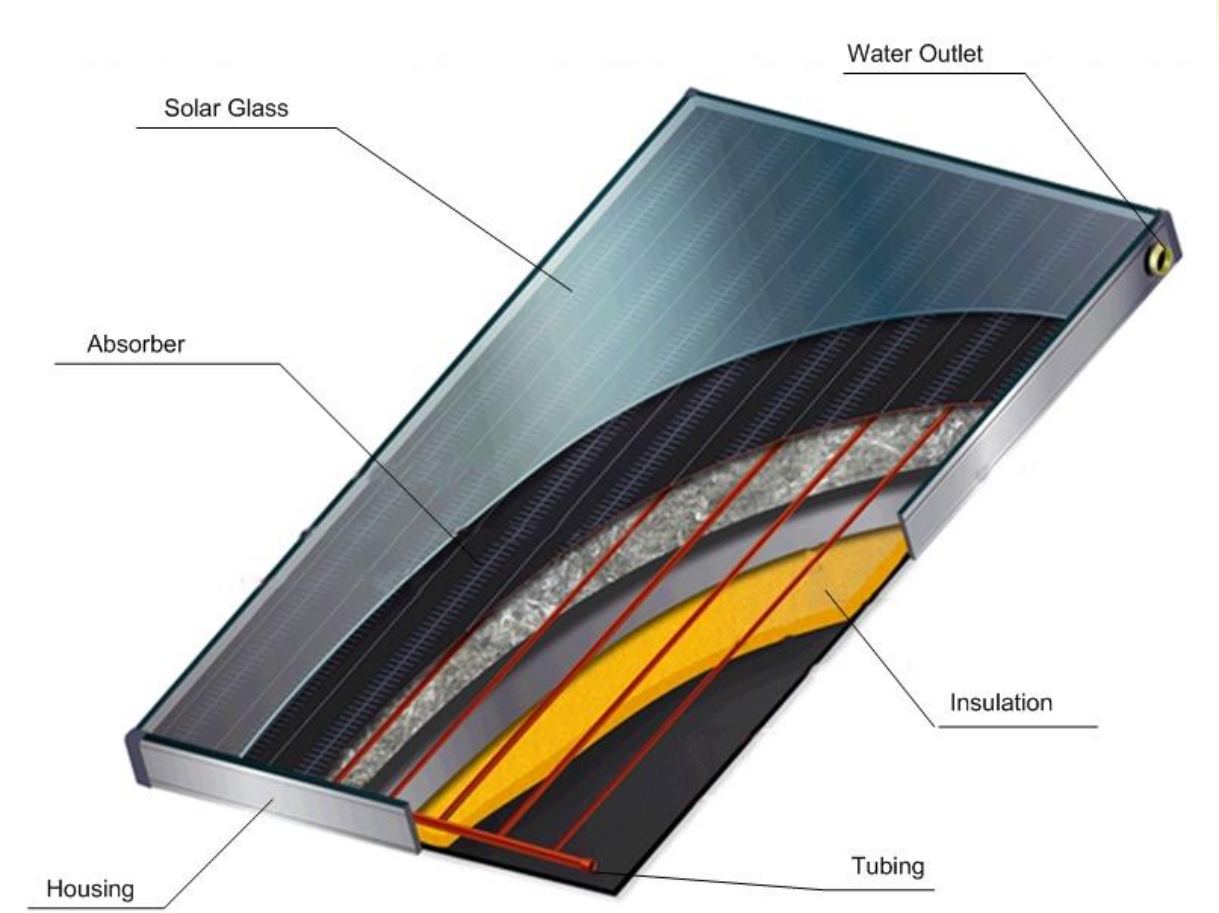


Solar Thermal Systems - Collectors

Flat Plate Collectors

Flat Plate:

Dark or coated tempered glass, designed to collect more heat

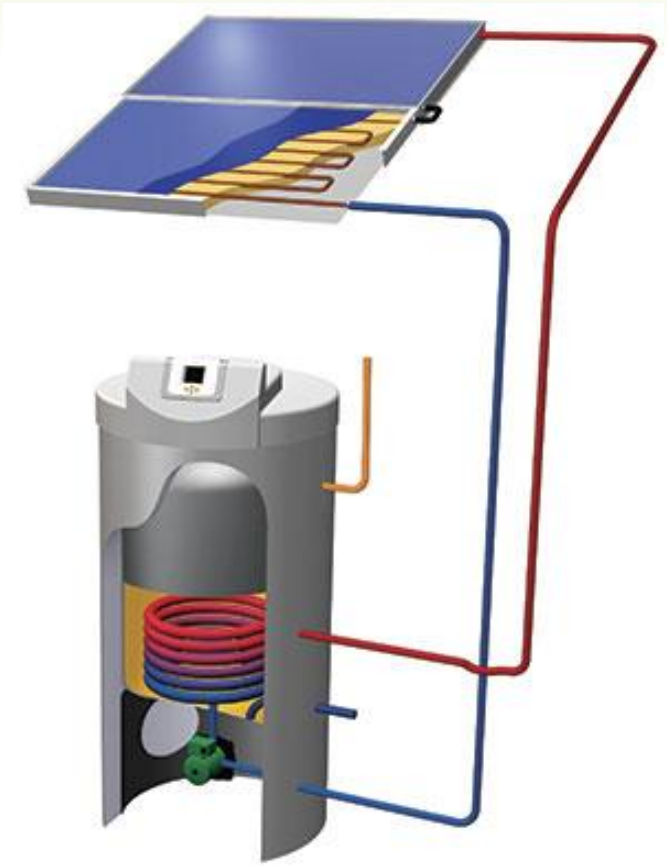


Simpler and cheaper; heavier; takes more room; heat to 180°F; sheds snow more easily

Indirect Closed-Loop Systems

Circulates a safe non-freezing fluid through pipes

Heat from pipes is transferred to the water in your tank



Solar PV or Solar Hot Water ?

Both good options! Much depends on individual circumstances. Consult with Installers for advice.

Solar PV	Solar Thermal
Ample unobstructed space? Lower efficiency not an issue.	Limited space? More efficient.
No-low upfront cash options?	Lower upfront cash?
Electric space heating?	Water heating a big potion of electric bill?
Is central A/C a big portion of electric bill?	Need additional space heating options?
Gas Hot Water Heater?	Electric, Oil, Propane Hot Water Heater?
1 – 2 person household	3+ person household

What Makes a Good Site?

- Southerly exposure
- No shading from trees or roof protrusions
- Newer roof with 20 years left in it;
- Few or no gables, chimneys, or vent pipes

What if my Site isn't Feasible?

- Opt for Energy Efficiency measures
  - Join the Power Saver Challenge!
- Purchase clean wind-powered energy through your utility
  - Washington Gas CleanSteps
- Consider a Solar Shed?

Courtesy of PotomacWindEnergy.com

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Solar Financials – Never a better time!

- **Tax incentives**
  - 30% Federal Tax Credit
- **Maryland Grants**
  - $1,000/project for Solar PV
  - $500/project for Solar Thermal
- **Solarize Frederick County Grants**
  - $2,000 or $2,500 for Solar PV
  - $750 or $1,000 for Solar Thermal
- **Sale of Solar Renewable Energy Credits (SRECs)**
- **Lease and no-money down options**
- **No Increases in Property Tax**
- **Talk to your tax advisor about taxes on incentive grants**

SOLARIZE Frederick County

SREC 101:

What is a Solar Renewable Energy Certificate?

- **A tradable certificate that represents the clean energy benefits of electricity generated from <u>your</u> solar system.**
- Issued to you regularly as your solar panels generate each 1000kiloWatt hours (1MWh).
- **An SREC is *sold <u>separately</u>* from the electric power the system generates.**
- SRECs are purchased by utilities to meet solar production mandates.
- **Values fluctuate with supply and demand. Currently around $130.**
- You can sell them yourself through online platforms or through an SREC Aggregator/Marketer.

Sustainable Frederick County

Green Homes Challenge Frederick County, MD

Solar PV Procurement – PURCHASE

- Pros:
  - Ability to take advantage of financial incentives and tax credits
  - Ability to sell Solar Renewable Energy Certificates (SRECs) every year…or
  - Ability to say home powered by solar energy (if do not sell SRECS)
  - Hedge against future increases in electricity prices
- Cons:
  - High upfront cash outlay or loan
  - Owner responsible for maintenance and repair

Solar PV Procurement - LEASE

- **Company or 3rd Party owns and maintains system; you lease it for ~15 or 20 years at fixed rate**
- **Options such as paying entire lease up-front, half up front, or paying monthly**

– **Pros:**
  - Low or no upfront costs
  - Fixed monthly payments may be less than utility rates
  - Company maintains and repairs equipment
  - Company, not you, assumes risk of fluctuating SREC values.

– **Cons:**
  - No financial incentives, tax credits, or SREC sales

– **What if I move?**

Solar PV Procurement - PPA

Power Purchase Agreement

- System owned by 3rd Party
- Long term contract to purchase generated power at low er rates
- Some offer buy-out option

– **Pros:**

- Low or no up-front costs; lower monthly payments
- Company maintains and repairs equipment
- Company, not you, assumes risk of fluctuating SREC values.
- Buy-out option

– **Cons:**

- No financial incentives, tax credits, or SREC sales

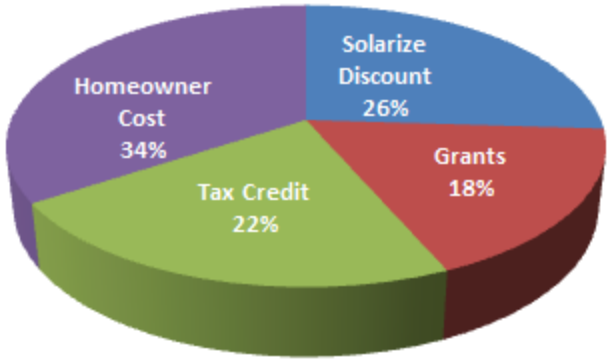
Solar PV Purchase – Financials

Great Case Scenario

Cost Analysis	4 kW
Average Installed Retail Cost of System	**$20,000**
Solarize Volume Purchase Discount (Tier 5)	-$5,200
Solarize $2,500 Incentive Grant (certified PS)	-$2,500
Maryland State Grant	-$1,000
Federal Tax Credit	-$4,440
Sale of Renewable Energy Credits (RECs)[1] YR 1	-$480
Estimated Electricity Savings in YR 1[2]	-$561
Total Discount, Grants, Credits, & Savings in YR 1:	-$14,181
Net Cost to System Owner at end of YR 1r:	**$5,819**
Years 2-7 Elec. Savings & REC Revenues:	$6,085
Net Cost to System Owner at end of Year 7:	**-$266**
Increased Property Resale Value[3]	$11,220

Breakdown of First Year Costs

(not including Electricty Saving or SREC Sales)



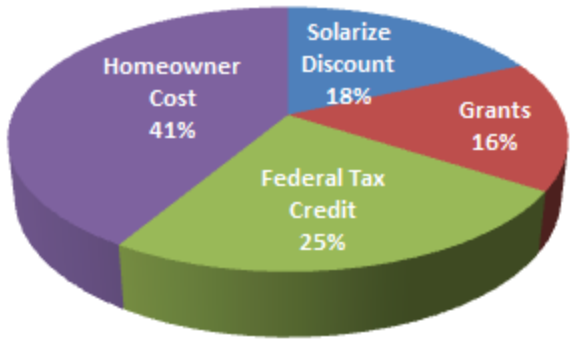
Solar Thermal Purchase - Financials

SOLARIZE Frederick County

Great Case Scenario

Cost Analysis Flat Plate Collectors	Sized for 2-3 people
Installed Retail Cost	**$9,446**
Solarize Discount (18.2%)	-$1,721
Solarize Grant (Certified PS)	-$1,000
MD State Grant	-$500
Federal Tax Credit	-$2,318
Electricity Savings in YR 1	-$417
SREC sale (1 SREC = $140) 5 max per year	-$560
Total Grants/Credits/Savings YR 1	-$6,515
Net Cost to System Owner YR 1	**$2,931**
Years 2-5 Electricity Savings	-$1,667
SREC 5-Yr average	-$2,800
Net Cost to System Owner (YR5)	**-$1,536**

Breakdown of First Year Costs
(not including electricity saving or SREC Sales)



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Process & Next Steps

www.SolarizeFrederick.org

1. Register for Green Homes Challenge
2. Use Power Saver Challenge to improve home efficiency & get higher grant
3. Attend Solarize 201 workshop and meet installers.
4. Sign up for FREE Solar Assessment and sign a contract! (<August 30)

www.FrederickGreenChallenge.org

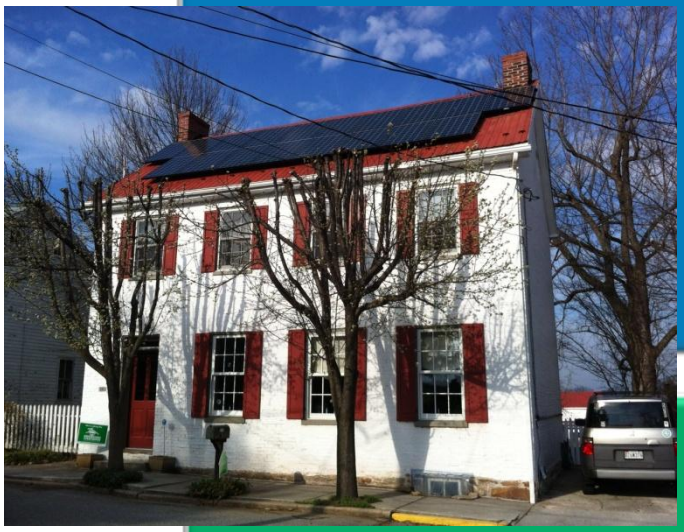
Next Steps

www.FrederickCountyMD.gov/GreenHomes

1. Connect with your community's Solarize Coordinator and Green Ambassadors
2. Tell your friends and neighbors about Solarize
3. Host a Mini-Solarize 101 in your home, church, or workplace.
4. Attend Solarize 201 April – June and meet the Installers and get financial details

Please fill out your evaluation form!

Contact for Questions



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Get Involved:
FrederickCountyMD.gov/GreenHomes

FrederickGreenChallenge.org